

### Social and Solitary Exercise among the Unemployed and Out of the Labor Force in the United States: Estimates by Gender and Partnership Status

**Margaret Gough Courtney<sup>1</sup>**

<sup>1</sup>University of La Verne, Department of Sociology and Anthropology, La Verne, CA, USA [mgough@laverne.edu](mailto:mgough@laverne.edu)

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#### Abstract

**Introduction:** The negative effects of unemployment are significant, and the potential for increased morbidity and mortality is a major public health challenge. Negative effects may be partially attributable to health behavior change and loss of social ties. Exercise has positive physical and mental health benefits and could help buffer such negative effects. This study examines whether time in social and solitary exercise varies by unemployment and out of the labor force (OOLF) status because exercise, especially social exercise, provides health benefits.

**Methods:** Gender-stratified ordinary least squares models are estimated using data from the nationally representative 2003-2016 American Time Use Surveys to test how own and partner employment status are associated with total time in exercise, exercise alone, with children, with a partner, and with others.

**Results:** Unemployed and OOLF men spend significantly more time in exercise alone (3-9 minutes,  $p < .05$ ) and with others (about 13 minutes,

$p < .001$ ) compared to employed men. Unemployed women spend significantly more time in exercise with others (6 minutes,  $p < .05$ ), and OOLF women in all types of social exercise (1-9 minutes,  $p < .05$ ), compared to employed women.

**Conclusions:** Unemployed and OOLF individuals engage in more social exercise, which could be leveraged to help buffer loss of social ties and improve health. Exercise-related interventions may help reduce negative health consequences of unemployment.

**Keywords:** physical activity, employment, American Time Use Survey

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## Introduction

The risk of negative health outcomes stemming from unemployment is a concern in many countries (Bambra & Eikemo, 2009; Brand & Burgard 2009; Drydakis, 2008; Stuckler et al., 2009). Especially in countries with high levels of unemployment (e.g., Greece (Drydakis, 2008) and countries with low levels of support for the unemployed (e.g., UK (Bambra & Eikemo, 2009), the potential for increased morbidity and mortality arising from unemployment is a significant public health concern. Furthermore, there are potential indirect effects of unemployment on other demographic phenomena, such as relationship formation, fertility, life expectancy, and population structure, resulting from increases in morbidity and mortality (Bennett, Bloom, & Ivanov, 1998; Lundquist, Anderton, & Yaukey, 2014; Veenhoven, 1989). The negative health outcomes of unemployment are thought to arise from factors such as stress and strain, loss of social ties, reduced resources, and health behavior changes (Brand & Burgard, 2008;

Falba et al., 2005; Kessler, Turner, & House, 1988; Rudas et al., 1991; Yeung & Hofferth, 1998). This paper focuses on the United States, a country with relatively limited government support for the unemployed, and examines one specific health behavior known to have implications for overall health and wellbeing: exercise.

The determinants of exercise are of interest to many in public health, medicine, and social science because exercise is associated with mental and physical health benefits (Courneya et al., 2003; Stewart et al., 1994; World Health Organization, 2017), and exercise behaviors can potentially be changed through intervention. Most Americans do not meet the minimum guidelines for exercise, which has implications for population health (Centers for Disease Control, 2017).

Some of the physical and mental health benefits of exercise may derive from the social aspect of exercise. Some studies find that participants report exercise to be more enjoyable (Carnes & Barkley, 2015) or stress reducing (Plante, Coscarelli, & Ford, 2001) when it is done with others. Meta-analyses suggest similar benefits of exercising with others, such as greater adherence to exercise (Burke et al. 2006), and better psychological and social health outcomes (Eime et al., 2013). Researchers argue these greater benefits derive from the social nature of participation (but mental health benefits do accrue from solitary activity) (Eime et al., 2013). Thus, psychological and quality of life benefits seem to arise partly from social aspects of exercise (Plante, 1999; Sato, Jordan, & Funk, 2013). Yet few large-scale studies have examined patterns of exercise with others versus alone. Because unemployed individuals are especially prone to

stress, relationship strain, and negative health outcomes (Falba et al., 2005; Kessler et al., 1988; Westman, Etzion, & Horovitz, 2004), and because job loss often results in disruption of social ties (Brand & Burgard, 2008; Yeung & Hofferth, 1998), exercising with others might be one way to mitigate this stress and disruption.

Unemployment has been examined as a determinant of exercise, but questions remain. For example, in couples, transitions into and out of unemployment are associated with changes in exercise for women but not men (Gough, 2017). Women increase exercise during unemployment and reduce exercise when their partners experience unemployment (Gough, 2017). Yet it remains unknown whether unemployed individuals exercise with others or alone, and how such patterns may differ by gender or partnership status. For example, perhaps men do not change their amount of exercise during unemployment but shift their exercise to be more social and less solitary. Knowing with whom the unemployed exercise (if anyone) is important for understanding the social benefits of exercise and whether they might be leveraged to improve health outcomes.

This study uses data from the American Time Use Survey (ATUS) to examine with whom individuals exercise, particularly unemployed and out of the labor force (OOLF) individuals. OOLF individuals are a non-working comparison to the unemployed. Whereas unemployment is an involuntary state, OOLF is a voluntary state, and there may be different implications for health and wellbeing. This study expands on recent research by including single and partnered individuals and examining solitary and social exercise. Results may help inform future research about exercise patterns, especially

among the unemployed, and may help inform public health interventions surrounding exercise or unemployment that could reduce potential demographic consequences of unemployment. Consistent with recent findings (Gough, 2017), this paper tests two hypotheses:

*H1:* Unemployed, OOLF, and employed men will spend similar amounts of time in total exercise, exercise alone, and exercise with children, partners, or others.

*H2:* Unemployed and OOLF women will spend more time in total exercise, exercise alone, and exercise with children, partners, or others, compared to employed women.

## Methods

The data comes from the 2003-2016 waves of the ATUS, which is a nationally representative time diary study conducted by the United States Bureau of Labor Statistics (BLS) and the Census Bureau. Respondents are interviewed about their time use on the previous day. The data was extracted from ATUS-X (Hofferth, Flood, & Sobek, 2013). Men and women ages 18-65 are included to cover the prime working ages.

The key independent variable is own employment status at the time of the interview (=1 if unemployed, =2 if OOLF; employed is omitted). For partnered individuals, the partner's employment status is also included, with employed partners being compared to unemployed/OOLF partners (these states cannot be separated for partners).

There are five dependent variables: minutes/day spent in exercise, and minutes of exercise done: (1) alone; (2) with a child; (3) with a

spouse/partner; (4) with others (e.g., friends, strangers). Minutes of exercise is the sum of time spent in several types of exercise (e.g., walking, cycling, basketball; see appendix table). Social exercise time is not mutually exclusive; a respondent could report exercising with a child and a partner. These measures were constructed in ATUS-X prior to extraction, and values were top-coded at the 99<sup>th</sup> percentile.

Controls include number of children, age of the youngest child (among those with children), respondent age, year, weekend time diary, state-level unemployment rate, race (white, black, American Indian/Alaskan Native, Asian/Hawaiian Pacific Islander, multiracial), ethnicity (Hispanic vs. not), immigrant status, region, metropolitan status, education (less than high school/GED, high school, some college, college degree), and marital status. These variables are associated with risk of unemployment, and for most there is evidence of an association with exercise (Brownson et al., 2000; Nomaguchi & Bianchi, 2004; Trost et al., 2002).

Observations with poor data quality (determined by BLS) were dropped (2,045 observations). Missing flags (i.e., dummy variables) are used for missing values on the two variables with missing data: state-level unemployment rate (<1% of the sample) and metropolitan status (approximately 6% of the sample). The main analytic samples range from 10,665 to 77,390 depending on respondent gender and whether models are restricted to individuals reporting at least some exercise.

Models are estimated in Stata 13 using ordinary least squares, with survey analytic procedures and replicate weights because of the complex survey sampling design of the ATUS. Gender-stratified models are

estimated because research indicates the relationship between unemployment and exercise differs by gender (Gough, 2017). All respondents are included in the models of total exercise time. Solitary and social exercise models are estimated for the sample reporting at least some exercise. Models are first estimated for all respondents and then re-estimated for partnered respondents, with partner's unemployment/OOLF status added as a predictor. This study was determined to be exempt from human subjects review by the University of La Verne institutional review board.

### Results

Descriptive statistics are shown in Table 1. On average the unemployed appear more disadvantaged than the employed. Exercise time ranges widely across the sample (0-235 minutes), with average times of approximately 11 minutes/day for women and approximately 21 minutes/day for unemployed men. More time is spent in activity alone or with others than with partners or children.

Table 1. Descriptive statistics, 2003-2016 American Time Use Survey

	<u>Men</u>		<u>Women</u>		
	<u>Unemployed</u>	<u>Not Unemployed</u>	<u>Unemployed</u>	<u>Not Unemployed</u>	
	<u>M (SE)/%</u> <sup>a</sup>	<u>M (SE)/%</u>	<u>M (SE)/%</u>	<u>M (SE)/%</u>	<u>Range</u>
Age	34.89 (0.29)	41.12 (0.03)	35.20 (0.28)	41.46 (0.03)	18-65
Race					
White	72%	83%	69%	81%	0-100
Black	21%	10%	23%	12%	0-100
American Indian/ Alaskan Native	1%	1%	2%	1%	0-100



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Asian/Pacific Islander	3%	4%	4%	4%	0-100
Multiracial	2%	1%	2%	1%	0-100
Hispanic	19%	16%	20%	14%	0-100
Immigrant	13%	16%	18%	15%	0-100
Education					
< High School	27%	15%	24%	13%	0-100
High school	32%	28%	28%	26%	0-100
Some college	28%	26%	30%	29%	0-100
College degree	13%	31%	18%	32%	0-100
Number of children	0.73 (0.02)	0.77 (0.004)	1.09 (0.03)	0.87 (0.004)	
Age of youngest child	8.00 (0.18)	7.27 (0.04)	6.34 (0.14)	7.10 (0.03)	0-17
Marital status (unpartnered omitted)					
Cohabiting	7%	5%	8%	5%	0-100
Married	32%	58%	38%	57%	0-100
Region					
Northeast	19%	18%	17%	18%	0-100
Midwest	23%	24%	24%	24%	0-100
South	33%	35%	37%	36%	0-100
West	25%	23%	23%	22%	0-100
Self-rated health					
Excellent	17%	20%	15%	20%	0-100
Very good	30%	36%	28%	35%	0-100
Good	37%	31%	37%	30%	0-100
Fair	13%	10%	16%	11%	0-100
Poor	2%	3%	4%	3%	0-100
Metropolitan	87%	83%	85%	83%	0-100
Weekend time diary	28%	29%	29%	29%	0-100
Out of the labor force	---	14%	---	27%	0-100
State-level unemployment rate	7.18 (0.05)	6.45 (0.01)	7.04 (0.04)	6.46 (0.01)	2.5-13.8
Exercise (minutes/day)					
Overall	21.41 (1.22)	15.07 (0.22)	11.21 (0.61)	10.95 (0.18)	0-235
Alone	8.60 (0.61)	6.03 (0.11)	4.22 (0.33)	4.27 (0.09)	0-110
With child	1.00 (0.17)	1.05 (0.04)	1.41 (0.17)	1.36 (0.04)	0-90
With spouse/partner	1.17 (0.18)	1.71 (0.06)	1.36 (0.19)	1.62 (0.05)	0-90
With others	21.41 (1.22)	15.07 (0.22)	11.21 (0.61)	10.95 (0.18)	0-235
N	3096	59088	3897	73493	

<sup>a</sup>Estimated using the replicate weights provided in the ATUS. For continuous variables, SDR standard errors are reported.



Results for the analysis are shown in Table 2. Columns 1 and 2 contain the results for all respondents. Panel 1 indicates that, on average, unemployed ( $B = 6.85, p < .001$ ) and OOLF ( $B = 8.02, p < .001$ ) men spend more time in exercise than employed men. This pattern is also seen for unemployed and OOLF women, but the magnitude of the coefficients is smaller.

Results for models of time in solitary or social activity are shown in Panels 2-5, and include only those reporting at least some exercise. Unemployed and OOLF men spend more time in exercise alone ( $B = 8.77, p < .001$ ;  $B = 3.69, p = .03$ , respectively) and with others ( $B = 13.54, p < .001$ ;  $B = 13.33, p < .001$ , respectively) compared to employed men. Thus, their activity patterns are similar regardless of whether they are unemployed or OOLF.

Women's results differ. Unemployed women spend more time in exercise with others ( $B = 6.23, p = .011$ ) than employed women, but there are no other significant differences. OOLF women spend more time in exercise with others ( $B = 8.88, p < .001$ ), with children ( $B = 1.32, p = .013$ ), and with partners ( $B = 2.60, p < .001$ ), compared to employed women.

Results for partnered individuals are shown in Columns 3 and 4. Unemployed and OOLF men and women follow the same pattern as in the full sample. Active men and women with unemployed/OOLF partners spend less time in exercise alone compared to those with employed partners ( $B = -3.42, p = .001$ ;  $B = -1.47, p = .009$ , respectively) and more time in exercise with the partner ( $B = 4.20, p = .002$ ;  $B = 6.77, p < .001$ , respectively).

Table 2. Estimates of association between unemployment, out of the labor force (OOLF), time (minutes/day) in exercise overall, and time spent in activity with others (among those reporting activity), for men and women, by co-residential partnership status, 2003-2016 ATUS

	Partnered and Non-Partnered Respondents				Partnered Respondents			
	Men (N=62184, 10665)		Women (N=77390, 11263)		Men (N=38320, 6396)		Women (N=44089, 6987)	
	B (SE)	p-value	B (SE)	p-value	B (SE)	p-value	B (SE)	p-value
<b>Panel 1. Minutes Exercise/Day</b>								
Unemployed	6.85 (1.27)	< .001	2.72 (0.64)	< .001	4.42 (1.67)	.008	4.43 (1.06)	< .001
OOLF	8.02 (0.87)	< .001	3.33 (0.41)	< .001	5.70 (0.96)	< .001	4.27 (0.51)	< .001
Partner unemp./OOLF					0.26 (0.56)	.638	-1.47 (0.56)	.009
R <sup>2</sup>	.03		.02		.03		.03	
<b>Panel 2. Minutes Exercise Alone</b>								
Unemployed	8.77 (2.24)	< .001	1.67 (1.79)	.351	5.46 (2.94)	.063	2.26 (2.16)	.295
OOLF	3.69 (1.70)	.030	1.29 (0.99)	.193	4.51 (1.75)	.010	0.24 (1.00)	.814
Partner unemp./OOLF					-3.42 (1.05)	.001	-2.71 (1.53)	.077
R <sup>2</sup>	.06		.05		.05		.04	
<b>Panel 3. Minutes Exercise w/Child</b>								
Unemployed	-0.40 (0.79)	.612	0.46 (0.85)	.590	4.21 (2.49)	.091	0.78 (1.59)	.625
OOLF	-0.91 (0.46)	.048	1.32 (0.53)	.013	1.09 (1.02)	.282	2.51 (0.90)	.005
Partner unemp./OOLF					1.59 (0.82)	.052	-0.03 (1.02)	.979
R <sup>2</sup>	.19		.25		.18		.23	
<b>Panel 4. Minutes Exercise w/Others</b>								
Unemployed	13.54 (3.51)	< .001	6.23 (2.44)	.011	16.33 (5.10)	.001	8.71 (3.41)	.011
OOLF	13.33 (2.41)	< .001	8.88 (1.65)	< .001	11.85 (3.03)	< .001	11.25 (1.86)	< .001
Partner unemp./OOLF					1.04 (2.12)	.626	-1.73 (2.09)	.406
R <sup>2</sup>	.08		.05		.08		.05	
<b>Panel 5. Minutes Exercise w/Partner</b>								
Unemployed	-0.05 (0.90)	.953	0.49 (1.15)	.673	1.96 (2.96)	.507	2.14 (2.47)	.387
OOLF	0.10 (0.66)	.885	2.60 (0.74)	< .001	1.61 (1.57)	.306	4.95 (1.23)	< .001
Partner unemp./OOLF					4.20 (1.38)	.002	6.77 (1.89)	< .001
R <sup>2</sup>	.14		.14		.07		.10	

<sup>a</sup>Model includes the following control variables: weekend day, state-level unemployment rate, number of children, age of the youngest child, region, metro status, respondent age, education, race, Hispanic ethnicity, immigrant status, marital status, and year

## Discussion

This study examined social versus solitary exercise patterns with a particular focus on the unemployed and OOLF. Exercise has many benefits, and social exercise could help buffer the negative effects of a job loss. *H1* states that unemployed, OOLF, and employed men spend similar amounts of time in all types of exercise. Unemployed and OOLF men spend more time exercising overall, alone, and with others compared to employed men, contrary to *H1*. These results conflict with research that indicated men do not change their exercise during unemployment (Gough, 2017). The current study is cross-sectional, so unobserved time-invariant characteristics may explain some of this conflict. Yet time diaries generally provide improved estimates compared to retrospective reports. Although unemployed and OOLF men also spend more time in solitary exercise, prior research suggests that men's frequent engagement in social exercise may provide benefits that could be leveraged to improve health outcomes.

*H2* states that unemployed and OOLF women spend more time in all types of exercise compared to employed women. Compared to employed women, unemployed women spend more time in exercise with others, and OOLF women spend more time in all types of social exercise. The difference between unemployed and OOLF women could arise if unemployed women are reluctant to significantly change time use in anticipation of re-employment. Thus, results partially support *H2* and are consistent with research that suggests unemployed women might use their "extra" time to invest in their health through exercise (Gough, 2017).

Consistent with men, results suggest it may be possible to leverage social exercise to help buffer the negative effects of unemployment and lost labor market ties.

During a partner's unemployment/OOLF both men and women spend less time exercising alone and more time exercising with a partner compared to those with employed partners. For men, total time in exercise does not vary by partner's unemployed/OOLF status, but women with non-working partners exercise slightly less. This is consistent with recent research (Gough, 2017) and may reflect differential labor market responses to a partner's unemployment/OOLF status. Men's partners are more likely to be voluntarily OOLF, and men tend to work full time, so they may not increase paid labor time if their partner stops working. Women's partners are more likely to be involuntarily unemployed, and women are more likely to work part time, which may lead to increased labor force participation during a partner's unemployment/OOLF, taking time from other activities.

Women's (and men's) greater exercise time with the partner during the partner's unemployment/OOLF may reflect their role in providing social support. Shared exercise might provide a means of social support during a stressful period. If exercising together is a form of social support for partners, these patterns could benefit the unemployed/OOLF partner and the household by reducing stress and strain (Jackson, 1992).

This study has limitations. Only one household respondent reported their time use, so dyadic analyses are not possible. Multiple forms of exercise were combined to facilitate comparisons; examining specific activities might be instructive, especially activities that facilitate social

interaction (e.g., team sports (Eime et al., 2013). Finally, this study is descriptive, and unobserved factors could drive employment status differences. Nonetheless, the results provide an important starting point for future research and new information about the social nature of exercise.

## Conclusion

Social versus solitary exercise is under-examined in the literature. Models estimated with ATUS data and focused on unemployed and OOLF individuals demonstrate that unemployed and OOLF men spend more time exercising overall, alone, and with others compared to employed men, contrary to *H1*. Compared to employed women, unemployed women spend more time in exercise with others, and OOLF women spend more time in all types of social exercise. Results partially support *H2* that unemployed and OOLF women would spend more time in all types of exercise compared to employed women. Men and women spend more time exercising with a partner if the partner is unemployed/OOLF compared to those with employed partners. These results are partly consistent with prior research. Future research should examine dyadic aspects in more detail with new data sets or by creatively leveraging existing data to learn more about the benefits and consequences of different exercise patterns across employment statuses. Understanding these exercise patterns may prove useful for researchers and health professionals interested in designing interventions to improve population health. Interventions might aim to reduce the negative health effects of unemployment, helping to buffer the stress and lost social ties that accompany job loss, thereby mitigating

negative societal consequences of widespread or poorly managed unemployment.

### **Conflict of Interest to Declare**

The authors have no conflicts of interest to disclose.

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## Appendix

### Appendix A1.

Table A1. *Components of Physical Activity Time*

Doing aerobics	Playing baseball
Playing basketball	Biking
Boating	Climbing, spelunking, caving
Dancing	Participating in equestrian sports
Fencing	Playing football
Golfing	Doing gymnastics
Hiking	Playing hockey
Participating in martial arts	Playing racquet sports
Participating in rodeo competitions	Rollerblading
Playing rugby	Running
Skiing, ice skating, snowboarding	Playing soccer
Playing softball	Using cardiovascular equipment
Playing volleyball	Walking
Participating in water sports	Weightlifting or strength training
Working out, unspecified	Wrestling
Doing yoga	Playing sports, n.e.c.